Patent claims

1. Method for the reprocessing of a thermoplastic polycondensate, having the following method steps:
   - introducing the polycondensate into an extruder (1) in a solid state,
   - heating the polycondensate to a temperature below the melting point and degassing and/or drying the polycondensate,
   - melting the polycondensate,

   characterized in that the degassing and/or drying of the polycondensate takes place in the solid state at a pressure below atmospheric pressure and/or with an inert gas being added.

2. Method according to claim 1, characterized in that the thermoplastic polycondensate is polyester, in particular polyethylene terephthalate, or polyamide.

3. Method according to claim 1 or 2, characterized in that the polycondensate is introduced into the extruder (1) in the form of flakes or powder, the thickness of the flakes being on average less than 2 mm and the greatest extent being on average less than 20 mm.

4. Method according to one of claims 1 to 3, characterized in that the polycondensate is flushed with the inert gas in the solid state.

5. Method according to one of claims 1 to 4, characterized in that the polycondensate is subjected to a pressure below atmospheric pressure and/or the inert gas already before it is introduced into the extruder (1).

6. Method according to one of claims 1 to 5, characterized in that the polycondensate is heated

to a temperature below the melting temperature of the polycondensate already before it is introduced into the extruder (1).

7. Method according to one of claims 1 to 6, characterized in that the inert gas is added at a temperature of 60°C to 250°C, preferably 100°C to 160°C.

8. Method according to one of claims 1 to 7, characterized in that, after the melting of the polycondensate, further degassing of the polycondensate melt takes place.

9. Method according to claim 8, characterized in that the degassing of the polycondensate melt takes place with an inert gas being added beforehand.

10. Method according to claim 9, characterized in that the inert gas is added in a condensed state to the polycondensate melt at an increased pressure and, subsequently, the pressure of the polycondensate melt is lowered, so that the inert gas escapes from the polycondensate melt.

11. Method according to claim 1, 4, 5, 7, 9 or 10, characterized in that the inert gas is nitrogen, dried air, carbon dioxide or a noble gas.

12. Method according to claim 8, 9 or 10, characterized in that the polycondensate melt can be passed through at least one melt pump.

13. Method according to claim 8, 9, 10 or 12, characterized in that the polycondensate melt is passed through at least one melt filter.

14. Method according to claim 13, characterized in that the use of melt filters may take place in the

conveying direction of the polycondensate, after melting of the polycondensate, preferably downstream of the extruder.

15. Method according to claim 13 or 14, characterized in that, following the melt filter, further degassing of the polycondensate may take place.

16. Method according to one of claims 1 to 15, characterized in that additional substances, such as color pigments, fillers, processing aids, stabilizers, substances reacting with the polycondensate and the like, are introduced into the extruder (1) along with the polycondensate.

17. Method according to claim 16, characterized in that the melt viscosity and/or melt elasticity of the polycondensate melt is modified by the use of a substance reacting with the polycondensate.

18. Method according to claim 17, characterized in that the substance reacting with the polycondensate increases the melt viscosity and/or melt elasticity of the polycondensate by a chain-extending and/or chain-crosslinking reaction with the polycondensate.

19. Method according to one of the preceding claims, characterized in that further polycondensation of the polycondensate melt may take place under vacuum conditions.

20. Extruder (1) for the reprocessing of a thermoplastic polycondensate, with an inlet opening (3) for introducing the polycondensate to be reprocessed in the solid state, an outlet opening (8) for discharging the reprocessed polycondensate in the melted state, two or more closely intermeshing screw shanks (10), which are arranged

in a barrel (2), extend from the inlet opening (3) in the direction of an outlet opening (8) and have at least a first conveying zone (11), for conveying the polycondensate in the solid state, a second conveying zone (12), for conveying the polycondensate in the melted state, and also kneading elements (13), arranged between the first conveying zone (11) and the second conveying zone (12), for melting the polycondensate, and at least one degassing opening (14), provided in the barrel (2) in the region of the first conveying zone (11), characterized in that a conveying device (17) is provided at the degassing opening (14) in order to convey polycondensate escaping via the degassing opening (14) back into the extruder (1).

21. Extruder according to claim 20, characterized in that the conveying device (17) comprises at least one conveying screw.

22. Extruder according to claim 21, characterized in that the conveying device (17) has two or more closely intermeshing conveying screws.

23. Extruder according to one of claims 20 to 22, characterized in that the conveying device (17) and/or the barrel surrounding the conveying device (17) is heatable.

24. Extruder according to one of claims 20 to 22, characterized in that a conveying device (20) is provided at the inlet opening (3) in order to introduce the polycondensate into the extruder (1) in a metered manner.

25. Extruder according to claim 24, characterized in that the inlet opening (3) serves at the same time as a degassing opening (14).

26. Extruder (1) for the reprocessing of a thermoplastic polycondensate, with an inlet opening (3) for introducing the polycondensate to be reprocessed in the solid state, an outlet opening (8) for discharging the reprocessed polycondensate in the melted state, a plurality of closely intermeshing screw shanks, which are arranged in a barrel (2), extend from the inlet opening (3) in the direction of an outlet opening (8) and have at least a first conveying zone (11), for conveying the polycondensate in the solid state, a second conveying zone (12), for conveying the polycondensate in the melted state, and also kneading elements (13), arranged between the first conveying zone (11) and the second conveying zone (12), for melting the polycondensate, and at least one degassing opening (14), provided in the barrel (2) in the region of the first conveying zone (11), characterized in that the barrel (2) is divided into an inner barrel (31) and an outer barrel (32) and the screw shanks are arranged in an annular form between the inner barrel (31) and the outer barrel (32), the screw shanks separating an outer space (34), formed between the outer barrel (32) and the screw shanks, from an inner space (33), formed between the inner barrel (31) and the screw shanks, and in that, in the region of the first conveying zone (11), the polycondensate is located either in the inner space (33) and the degassing opening (14) is connected to the outer space (34), or the polycondensate is located in the outer space (34) and the degassing opening (14) is connected to the inner space (33).

27. Extruder according to one of claims 20 to 26, characterized in that the degassing opening (14) is subjected to a negative pressure and/or an inert gas serving for flushing purposes is carried away via the degassing opening (14).

28. Extruder according to claim 27, characterized in that the barrel (2) has in the region of the first conveying zone (11) at least one opening (15, 44) for the feeding in of the inert gas.

29. Extruder according to one of claims 20 to 28, characterized in that the barrel (2) is heatable in the region of the first conveying zone (11).

30. Extruder according to claim 26, characterized in that a conveying device (17) is provided at the degassing opening (14).

31. Extruder according to one of claims 20 to 30, characterized in that the kneading elements (13) have a total length L, the ratio L/D of the total length L of the kneading elements (13) to the diameter D of the screw shanks lying between 1 and 2.